

Appl. No. : 10/020,544

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all previous listings of claims in this application.

1-4. (Canceled)

5. (Currently amended) In a pneumatically controlled continuous positive airway pressure apparatus for supplying breathable gas from a pressurized source to an individual's breathing appliance, which appliance has an inlet for receiving the gas and an inhalation/exhalation valve for routing the gas to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve assembly having a supply inlet port adapted to be fluidly connected to the pressurized source, an outlet port adapted to be fluidly connected to the appliance's inlet, a reference chamber and a control assembly responsive to a pressure differential between a reference chamber pressure and an outlet port pressure for fluidly connecting and disconnecting the inlet port to and from the outlet port; and

at least one adjustable back pressure regulator fluidly connected to the pressurized source and the reference chamber for setting the pressure in the reference chamber at a selected level above atmospheric pressure,

wherein

the demand valve assembly includes a main valve disposed between the inlet and outlet ports, wherein the control assembly causes the [[first]] main valve to open and fluidly connect the inlet port to the outlet port when the outlet port pressure falls below the pressure in the reference chamber and for causing the main valve to close to fluidly disconnect the inlet from the outlet port when outlet port pressure rises to the pressure in the reference chamber;

wherein

the control assembly comprises a control valve; and

the demand valve assembly includes a pressurized nebulizer outlet and a nebulizer valve responsive to the status of the control valve for fluidly connecting and disconnecting the nebulizer outlet to the inlet port when the control valve is closed and opened, respectively.

6. (Canceled)

Appl. No. : 10/020,544

7. (Currently amended) In a pneumatically controlled continuous positive airway pressure apparatus for supplying breathable gas from a pressurized source to an individual's breathing appliance, which appliance has an inlet for receiving the gas and an inhalation/exhalation valve for routing the gas to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve assembly having a supply inlet port adapted to be fluidly connected to the pressurized source, an outlet port adapted to be fluidly connected to the appliance's inlet, a reference chamber and a control valve assembly responsive to a pressure differential between a reference chamber pressure and an outlet port pressure for fluidly connecting and disconnecting the inlet port to and from the outlet port; and

at least one adjustable back pressure regulator fluidly connected to the pressurized source and the reference chamber for setting the pressure in the reference chamber at a selected level above atmospheric pressure,

wherein

the demand valve assembly includes a main valve disposed between the inlet and outlet ports,

the control valve assembly comprises a control valve,

the control valve assembly causes the main valve to open and fluidly connect the inlet port to the outlet port when the outlet port pressure falls below the pressure in the reference chamber and for causing the main valve to close to fluidly disconnect the inlet from the outlet port when outlet port pressure rises to the pressure in the reference chamber,

the main valve comprises a diaphragm valve with first and second actuating chambers disposed on opposite sides of the diaphragm, the area of the diaphragm exposed to the second chamber being smaller than the area of the diaphragm exposed to the first chamber whereby the main valve will remain closed when the pressure in the two actuating chambers is substantially the same and will open when the pressure in the first chamber falls below the pressure in the second chamber by a preset amount, and

The apparatus of claim 5, wherein the nebulizer valve is a diaphragm valve with first and second chambers disposed on opposite sides of the

Appl. No. : 10/020,544

diaphragm, the first chamber being in fluid communication with the first chamber of the main valve, the second chamber of the nebulizer valve being in fluid communication with the nebulizer outlet and with the second chamber of the main valve through a flow restrictor.

8-10. (Canceled)

11. (Currently amended) In a pneumatically controlled continuous positive airway pressure apparatus for supplying breathable gas from a pressurized source to an individual's breathing appliance, which appliance has an inlet for receiving the gas and an inhalation/exhalation valve for routing the gas to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve assembly having a supply inlet port adapted to be fluidly connected to the pressurized source, an outlet port adapted to be fluidly connected to the appliance's inlet, a reference chamber and a control assembly responsive to a pressure differential between a reference chamber pressure and an outlet port pressure for fluidly connecting and disconnecting the inlet port to and from the outlet port; and

at least one adjustable back pressure regulator fluidly connected to the pressurized source and the reference chamber for setting the pressure in the reference chamber at a selected level above atmospheric pressure,

wherein

the demand valve assembly includes a first or main valve disposed between the inlet and outlet ports, wherein the control assembly causes the main valve to open and fluidly connect the inlet port to the outlet port when the outlet port pressure falls below the pressure in the reference chamber and for causing the main valve to close to fluidly disconnect the inlet from the outlet port when outlet port pressure rises to the pressure in the reference chamber;

the main valve comprises a diaphragm valve with first and second actuating chambers disposed on opposite sides of the diaphragm, the area of the diaphragm exposed to the second chamber being smaller than the area of the diaphragm exposed to the first chamber whereby the main valve will remain closed when the pressure in the two actuating chambers is substantially the same

Appl. No. : 10/020,544

and will open when the pressure in the first chamber falls below the pressure in the second chamber by a preset amount;

the control assembly comprises a control valve comprising a diaphragm valve with the reference chamber and a second chamber disposed on opposite sides of a pressure sensing diaphragm, the second chamber being in fluid communication with the outlet port;

both chambers of the main valve are fluidly connected to the inlet port, the fluid connection to the first chamber including a restrictor for restricting the flow rate;

the control assembly further includes a normally closed pilot valve fluidly connected to the first chamber of the main valve, the pilot valve opening to fluidly connect the first chamber of the main valve to the second chamber of the control valve in response to the movement of the sensing diaphragm as a result of the pressure in the second chamber of the control valve falling below the pressure in the reference chamber; and

the pilot valve includes a spring biased member which maintains the pilot valve normally closed.

12. (Currently amended) In a pneumatically controlled continuous positive airway pressure apparatus for supplying breathable gas from a pressurized source to an individual's breathing appliance, which appliance has an inlet for receiving the gas and an inhalation/exhalation valve for routing the gas to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve assembly having a supply inlet port adapted to be fluidly connected to the pressurized source, an outlet port adapted to be fluidly connected to the appliance's inlet, a reference chamber and a control assembly responsive to a pressure differential between a reference chamber pressure and an outlet port pressure for fluidly connecting and disconnecting the inlet port to and from the outlet port; and

at least one adjustable back pressure regulator fluidly connected to the pressurized source and the reference chamber for setting the pressure in the reference chamber at a selected level above atmospheric pressure,

wherein

Appl. No. : 10/020,544

the demand valve assembly includes a first or main valve disposed between the inlet and outlet ports, wherein the control assembly causes the main valve to open and fluidly connect the inlet port to the outlet port when the outlet port pressure falls below the pressure in the reference chamber and for causing the main valve to close to fluidly disconnect the inlet from the outlet port when outlet port pressure rises to the pressure in the reference chamber;

the main valve comprises a diaphragm valve with first and second actuating chambers disposed on opposite sides of the diaphragm, the area of the diaphragm exposed to the second chamber being smaller than the area of the diaphragm exposed to the first chamber whereby the main valve will remain closed when the pressure in the two actuating chambers is substantially the same and will open when the pressure in the first chamber falls below the pressure in the second chamber by a preset amount;

the control assembly comprises a control valve comprising a diaphragm valve with the reference chamber and a second chamber disposed on opposite sides of a pressure sensing diaphragm, the second chamber being in fluid communication with the outlet port;

both chambers of the main valve are fluidly connected to the inlet port, the fluid connection to the first chamber including a restrictor for restricting the flow rate;

further comprising a nebulizer valve, wherein the nebulizer valve is a diaphragm valve having first and second actuating chambers disposed on opposite sides of the diaphragm, the first chamber being in fluid communication with the first chamber of the main valve, the second chamber being in fluid communication with a pressurized nebulizer outlet.

13. (Currently amended) In a pneumatically controlled continuous positive airway pressure apparatus for supplying breathable gas from a pressurized source to an individual's breathing appliance, which appliance has an inlet for receiving the gas and an inhalation/exhalation valve for routing the gas to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

Appl. No. : 10/020,544

a demand valve assembly having a supply inlet port adapted to be fluidly connected to the pressurized source, an outlet port adapted to be fluidly connected to the appliance's inlet, a reference chamber and a control assembly responsive to a pressure differential between a reference chamber pressure and an outlet port pressure for fluidly connecting and disconnecting the inlet port to and from the outlet port; and

at least one adjustable back pressure regulator fluidly connected to the pressurized source and the reference chamber for setting the pressure in the reference chamber at a selected level above atmospheric pressure,

wherein

the demand valve assembly includes a first—or main valve disposed between the inlet and outlet ports, wherein the control assembly causes the main valve to open and fluidly connect the inlet port to the outlet port when the outlet port pressure falls below the pressure in the reference chamber and for causing the main valve to close to fluidly disconnect the inlet from the outlet port when outlet port pressure rises to the pressure in the reference chamber; and

at least one adjustable pressure regulator includes a line with a flow restrictor fluidly connected between the pressurized source and the reference chamber and a first adjustable poppet valve fluidly connected between said line upstream from the flow restrictor and atmosphere.

14. (Currently amended) In a pneumatically controlled continuous positive airway pressure apparatus for supplying breathable gas from a pressurized source to an individual's breathing appliance, which appliance has an inlet for receiving the gas and an inhalation/exhalation valve for routing the gas to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve assembly having a supply inlet port adapted to be fluidly connected to the pressurized source, an outlet port adapted to be fluidly connected to the appliance's inlet, a reference chamber and a control assembly responsive to a pressure differential between a reference chamber pressure and an outlet port pressure for fluidly connecting and disconnecting the inlet port to and from the outlet port; and

Appl. No. : 10/020,544

at least one adjustable back pressure regulator fluidly connected to the pressurized source and the reference chamber for setting the pressure in the reference chamber at a selected level above atmospheric pressure,

wherein

the demand valve assembly includes a first or main valve disposed between the inlet and outlet ports, wherein the control assembly causes the main valve to open and fluidly connect the inlet port to the outlet port when the outlet port pressure falls below the pressure in the reference chamber and for causing the main valve to close to fluidly disconnect the inlet from the outlet port when outlet port pressure rises to the pressure in the reference chamber;

the control assembly comprises a control valve; and

said at least one pressure regulator comprises two pressure regulators, at least one which is manually adjustable and a inhalation/exhalation selector, the two pressure regulators in conjunction with the selector being arranged to set the pressure in the reference chamber at one level during the inhalation phase and at a different level during the exhalation phase.

15. (Previously presented) The apparatus of claim 14, wherein the reference chamber is fluidly connected to the pressurized source through a restrictor and wherein each pressure regulator includes a poppet valve, each poppet valve having an inlet and an outlet, the outlets being in fluid communication with the atmosphere, the inlet of one of the poppet valves being in constant fluid communication with the reference chamber upstream from the restrictor, and further including a selector valve for placing the inlet of the other poppet valve in fluid communication with the reference chamber, upstream of the restrictor, in response to the closure of the main valve.

16. (Previously presented) The apparatus of claim 15, wherein both pressure regulators are manually adjustable.

17. (Previously presented) The apparatus of claim 15, wherein the selector valve is a diaphragm valve.

18. (Previously presented) The apparatus of claim 17, wherein the selector valve includes first and second chambers disposed on opposite sides of the diaphragm with the first

Appl. No. : 10/020,544

chamber being in fluid communication with a nebulizer outlet and the second chamber being in fluid communication with the reference chamber.

19. (Previously presented) The apparatus of claim 14, wherein the other pressure regulator is not manually adjustable by an operator in the field and functions to set the pressure in the reference chamber at a set pressure above the exhalation reference pressure during the inhalation phase.

20. (Previously presented) The apparatus of claim 19, wherein each of the pressure regulators includes a poppet valve and the selector comprises a diaphragm valve.

21-35. (Canceled)

36. (Currently amended) In a pneumatically controlled CPAP apparatus for supplying breathable O₂ from a pressurized source to an individual's breathing appliance, which appliance has a patient valve with an inlet for receiving the O₂ and an inhalation/exhalation valve for routing the O₂ to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve having a supply inlet port adapted to be connected to the pressurized source, an outlet port adapted to be connected to the appliance's inlet and a valve assembly responsive to a reference pressure and an appliance inlet pressure for connecting the inlet port to the outlet port when the appliance inlet pressure falls below the reference pressure and for disconnecting the inlet port from the outlet port when the appliance inlet pressure rises to the reference pressure; and

at least one adjustable back pressure regulator coupled to the demand valve for allowing an operator to set the reference pressure at a selected level above atmospheric and change that level during the treatment of a patient,

wherein said at least one pressure regulator comprises two pressure regulators, one of which is manually adjustable by the operator and an inhalation/exhalation selector, the two pressure regulators in conjunction with the selector being arranged to set the reference pressure at one level during [[the]] an inhalation phase and at a lower level during [[the]] an exhalation phase.

37. (Previously presented) In a pneumatically controlled CPAP apparatus for supplying breathable O₂ from a pressurized source to an individual's breathing appliance, which appliance has a patient valve with an inlet for receiving the O₂ and an inhalation/exhalation valve

Appl. No. : 10/020,544

for routing the O₂ to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve having a supply inlet port adapted to be connected to the pressurized source, an outlet port adapted to be connected to the appliance's inlet and a valve assembly responsive to a reference pressure and an appliance inlet pressure for connecting the inlet port to the outlet port when the appliance inlet pressure falls below the reference pressure and for disconnecting the inlet port from the outlet port when the appliance inlet pressure rises to the reference pressure; and

at least one adjustable back pressure regulator coupled to the demand valve for allowing an operator to set the reference pressure at a selected level above atmospheric and change that level during the treatment of a patient,

wherein the demand valve includes a pressurized nebulizer outlet and a valve responsive to the flow of O₂ between the inlet and outlet port for connecting and disconnecting the nebulizer outlet to the inlet port when the inlet port is connected to and disconnected from the outlet port, respectively.

38. (Previously presented) In a pneumatically controlled CPAP apparatus for supplying breathable O₂ from a pressurized source to an individual's breathing appliance, which appliance has a patient valve with an inlet for receiving the O₂ and an inhalation/exhalation valve for routing the O₂ to the individual's lungs and the exhaled air to the atmosphere, the apparatus comprising:

a demand valve having a supply inlet port adapted to be connected to the pressurized source, an outlet port adapted to be connected to the appliance's inlet and a valve assembly responsive to a reference pressure and an appliance inlet pressure for connecting the inlet port to the outlet port when the appliance inlet pressure falls below the reference pressure and for disconnecting the inlet port from the outlet port when the appliance inlet pressure rises to the reference pressure; and

at least one adjustable back pressure regulator coupled to the demand valve for allowing an operator to set the reference pressure at a selected level above atmospheric and change that level during the treatment of a patient,

further including a pressure gauge connected to the demand valve to inform an operator of the selected reference pressure.

Appl. No. : 10/020,544

39. (Previously presented) The apparatus of claim 38, wherein said at least one operator adjustable pressure regulator is connected to the pressurized source as well as to the demand valve and wherein the demand valve includes a reference chamber for receiving the reference pressure and wherein the valve assembly is arranged to compare the appliance inlet pressure with the pressure in the reference chamber.

40. (Previously presented) The apparatus of claim 39, wherein said at least one operator adjustable pressure regulator includes a line with a flow restrictor connected between the pressurized source and the reference chamber and a first adjustable poppet valve connected between said line upstream from the flow restrictor and atmosphere.

41-44. (Canceled)